3GPP TSG-RAN WG2 Meeting #112e R2-20xxxxx

Online, 2-13 November 2020

**Agenda item: 6.5.3**

**Source: Nokia, Nokia Shanghai Bell**

**Title: [DRAFT] Summary of e-mail discussion: [AT112-e][043][IIOT] MAC II (Nokia)**

**WID/SID: NR\_IIOT - Release 16**

**Document for: Discussion and Decision**

# 1 Introduction

This document aims to collect views from companies for the following email discussion during RAN2 #112e:

* [AT112-e][043][IIOT] MAC II (Nokia)

Scope: Treat R2-2009539, R2-2009540, R2-2009753, R2-2010053, R2-2010100, R2-2010522

Intended outcome: Intermediate: Determine agreeable parts. Final: For agreeable parts, agreed CRs.

Deadline: Intermediate deadline(s) by Rapporteur, Final: Thu Nov 12, 1200 UTC

The papers to be considered in this email discussion are listed below:

|  |
| --- |
| [R2-2009539](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_112-e\Docs\R2-2009539.zip) Correction on autonomous transmission for the deprioritized CG-Alt1 OPPO CR Rel-16 38.321 16.2.1 0932 - F NR\_IIOT-Core  [R2-2009540](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_112-e\Docs\R2-2009540.zip) Correction on autonomous transmission for the deprioritized CG-Alt2 OPPO CR Rel-16 38.321 16.2.1 0933 - F NR\_IIOT-Core  [R2-2009753](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_112-e\Docs\R2-2009753.zip) Configured grant timer termination upon PUSCH cancellation Nokia, Nokia Shanghai Bell CR Rel-16 38.321 16.2.1 0940 - F NR\_IIOT-Core  [R2-2010053](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_112-e\Docs\R2-2010053.zip) Clarification for CG overlapping with PUSCH duration of MSGA Ericsson CR Rel-16 38.321 16.2.1 0958 - F NR\_IIOT-Core  [R2-2010100](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_112-e\Docs\R2-2010100.zip) Correction on construction of Multiple Entry CG Confirmation MAC CE Huawei, HiSilicon CR Rel-16 38.321 16.2.1 0960 - F NR\_IIOT-Core  [R2-2010522](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_112-e\Docs\R2-2010522.zip) Correction of Multiple Entry Configured Grant Confirmation Samsung CR Rel-16 38.321 16.2.1 0992 - F NR\_IIOT-Core |

In general the papers can be categorized into three areas that will be tackled by this email discussion

1. ConfiguredGrantTimer behaviour considering autonomous transmission (R2-2009539, R2-2009540, and R2-2009753)
2. Clarification of overlapping between CG-PUSCH and MSGA in different serving cells (R2-2010053)
3. Issues relating to Multiple Entry CG Confirmation MAC CE (R2-20010100 and R2-2010522)

Please provide your contact information when responding:

|  |  |
| --- | --- |
| **Company** | **Contact Name / Email** |
|  |  |
| Nokia | Ping-Heng Wallace Kuo / Ping-Heng.Kuo@nokia.com |
| LG | SunYoung LEE/ ssunyoung.lee@lge.com |
| Ericsson | Zhenhua Zou, [Zhenhua.Zou@ericsson.com](mailto:Zhenhua.Zou@ericsson.com) |
| Samsung | Sangkyu Baek / sangkyu.baek@samsung.com |

# 2 Discussion

## 2.1 Configured Grant Timer Behaviour considering Autonomous Transmission

In R2-2009539, R2-2009540, and R2-2009753, a potential issue relating to configured grant timer and autonomous transmission has been identified. In particular, as it was agreed earlier in RAN2 that CG timer should start at the beginning of the CG PUSCH, there could be a case where the CG PUSCH is cancelled/deprioritized in the middle of its transmission due to intra/inter-UE prioritization, and autonomous transmission cannot be performed immediately because the CG timer continues to run which blocks subsequent CG resources with the same HARQ process for new transmission. Although these papers are considering the same problem, they have different proposals regarding how TS 38.321 should be updated to resolve the issue.

**Question 1: Do you think autonomous transmission blocking due to CG timer running is an issue that should be solved in RAN2 ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **YES/NO** | **Comments** |
| Nokia | Yes | The main purpose of expiration timer is to avoid MAC PDU stored in the HARQ buffer being overwritten by a newly generated MAC PDU. With autonomous transmission, the same MAC PDU is fetched from the same HARQ buffer so there is no issue of overwriting. Hence, running the CG timer is not needed in this case.  Moreover, the de-prioritized MAC PDU could convey some crucial data and delay-sensitive MAC CEs that should be delivered as soon as possible. Therefore, it is not desirable to unnecessarily wait until expiration of CG timer to conduct autonomous transmission of such MAC PDU. |
| LG | Yes |  |
| ZTE | No | Technically, it can happen only if NW configure a terrible configuration of *configuredGrantTimer* to UE. which means the *configuredGrantTimer* shall be configured longer than a cycle of HARQ process ID within one configured grant configuration, as a result, if one CG occasion with a HARQ process ID is used for new transmission , the next CG occasion with the same HARQ process ID will be blocked by the still running of *configuredGrantTimer.* As shown below:    So I think this kind of terrible *configuredGrantTimer* length is not permitted in order to avoid the efficiency of CG resources utilization will be reduced to only 50%. |
| Ericsson | Yes | Our understanding from IIoT discussion is that the timer is not started when the CG PUSCH is cancelled/deprioritized in the middle of its transmission due to intra/inter-UE prioritization. But, we do see a need to clarify the spec, in light of the changes made by NR-U.  One mis-alignment is that it is not clear what it means by “the transmission is performed”. Our understanding from the discussion on “autonomous transmission for CG” is that if the CG PUSCH is cancelled/de-prioritized in the middle, it is not considered as performed. This can be seen from the below except from the 5.4.2 for autonomous transmission:   |  | | --- | | 3> if a MAC PDU had already been obtained for this HARQ process; and  3> if the uplink grant size matches with size of the obtained MAC PDU; and  3> if a transmission of the obtained MAC PDU has not been performed:  4> consider the MAC PDU has been obtained. |   If this is still the common understanding, then UE does not start the timer and there is no issue. A smart UE implementation can handle this, e.g., by retroactively counting the timer started at the first symbol when the transmission is clearly performed.  However, in the same subclause 5.4.2, “the transmission is performed” means the transmission is started but not finished according to NR-U WI. Otherwise, there is no point of having the condition “the transmission is performed”, since LBT fails means that the transmission is not finished.   |  | | --- | | 5> if the transmission is performed and LBT failure indication is received from lower layers:  6> consider the identified HARQ process as pending. |   If IIoT follows NR-U understanding, then the above yellow-highlighted bullet 3> needs to be clarified to mean that “the transmission is not completed, e.g., cancelled or de-prioritized”. |
| Samsung | Yes |  |

It is noted that R2-2009539 proposes to change the timing of where CG timer should be started to the end of PUSCH, while both R2-2009540 and R2-2009753 are suggesting to stop the CG timer directly upon cancellation of the PUSCH. The proposed text changes of these papers are copied below for convenience.

**R2-2009539:**

|  |
| --- |
| 5.4.2.1 HARQ Entity  **……**  When determining if NDI has been toggled compared to the value in the previous transmission the MAC entity shall ignore NDI received in all uplink grants on PDCCH for its Temporary C-RNTI.  When *cg-RetransmissionTimer* is started or restarted by a PUSCH transmission, it shall be started at the beginning of the first symbol of the PUSCH transmission. When *configuredGrantTimer* is started or restarted by a PUSCH transmission, it shall be started at the end of the last symbol of the PUSCH transmission. |

**R2-2009540:**

|  |
| --- |
| 5.4.2.1 HARQ Entity  **……**  When determining if NDI has been toggled compared to the value in the previous transmission the MAC entity shall ignore NDI received in all uplink grants on PDCCH for its Temporary C-RNTI.  When *configuredGrantTimer* or *cg-RetransmissionTimer* is started or restarted by a PUSCH transmission, it shall be started at the beginning of the first symbol of the PUSCH transmission. If the PUSCH is for a deprioritized uplink configured grant and *cg-RetransmissionTimer* is not configured, the MAC entity shall stop the *configuredGrantTimer*,if running, for the corresponding HARQ process, and consider the transmission of the deprioritized MAC PDU is not performed. |

**R2-2009753:**

|  |
| --- |
| 5.4.1 UL Grant reception **……**  If the corresponding PUSCH transmission of a configured uplink grant is cancelled by CI-RNTI as specified in clause 11.2A of TS 38.213 [6] or cancelled by a high PHY-priority PUCCH transmission as specified in clause 9 of TS 38.213 [6], this configured uplink grant is considered as a de-prioritized uplink grant, and *configuredGrantTimer* for the correponding HARQ process of this de-prioritized uplink grant should be stopped if it is running.  When the MAC entity is configured with *lch-basedPrioritization*, for each uplink grant whose associated PUSCH can be transmitted by lower layers, the MAC entity shall:  1> if this uplink grant is addressed to CS-RNTI with NDI = 1 or C-RNTI:  2> if there is no overlapping PUSCH duration of a configured uplink grant which was not already de-prioritized, in the same BWP whose priority is higher than the priority of the uplink grant; and  2> if there is no overlapping PUCCH resource with an SR transmission which was not already de-prioritized and the priority of the logical channel that triggered the SR is higher than the priority of the uplink grant:  3> consider this uplink grant as a prioritized uplink grant;  3> consider the other overlapping uplink grant(s), if any, as a de-prioritized uplink grant(s);  3> consider the other overlapping SR transmission(s), if any, as a de-prioritized SR transmission(s).  1> else if this uplink grant is a configured uplink grant:  2> if there is no overlapping PUSCH duration of another configured uplink grant which was not already de-prioritized, in the same BWP, whose priority is higher than the priority of the uplink grant; and  2> if there is no overlapping PUSCH duration of an uplink grant addressed to CS-RNTI with NDI = 1 or C-RNTI which was not already de-prioritized, in the same BWP, whose priority is higher than or equal to the priority of the uplink grant; and  2> if there is no overlapping PUCCH resource with an SR transmission which was not already de-prioritized and the priority of the logical channel that triggered the SR is higher than the priority of the uplink grant:  3> consider this uplink grant as a prioritized uplink grant;  3> consider the other overlapping uplink grant(s), if any, as a de-prioritized uplink grant(s);  4> stop the *configuredGrantTimer* for the correponding HARQ process of this de-prioritized uplink grant, if this de-prioritized uplink grant is a configured uplink grant whose PUSCH has already started;  3> consider the other overlapping SR transmission(s), if any, as a de-prioritized SR transmission(s).  **……** |

**Question 2: If your answer to Question 1 is YES, what is your preferred approach to solve the issue?**

* **Option 1 – Change MAC specification such that CG timer starts at the end of the last OFDM symbol of the PUSCH (R2-2009539)**
* **Option 2 – Stop the CG timer upon deprioritization/cancellation of the CG-PUSCH (R2-2009540 and R2-2009753)**

**If you prefer Option 2, please also indicate whether you prefer text proposal in R2-2009540 or R2-2009753.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Option** | **Comments** |
| Nokia | Option 2 | Option 1 requires RAN2 to revert the agreement that has just been made in RAN2#111e, and this is absolutely not desirable to change agreements back and forth. Therefore Option 2 is much simpler.  Also, we prefer R2-2009753 as it directly address the case of PUSCH cancellation due to inter/intra-UE prioritization. |
| L | Option 2 | We prefer the proposed change in R2-2009753 with a small modification:  If the corresponding PUSCH transmission of a configured uplink grant is cancelled by CI-RNTI as specified in clause 11.2A of TS 38.213 [6] or cancelled by a high PHY-priority PUCCH transmission as specified in clause 9 of TS 38.213 [6], this configured uplink grant is considered as a de-prioritized uplink grant, and *configuredGrantTimer* for the correponding HARQ process of this de-prioritized configured uplink grant should be stopped if it is running |
| ZTE | No | As mentioned in above issue, this kind of configuredgrantTimer length shall be definitely avoided by NW configuration especially for this terrible configuration. |
| Ericsson | Option 2 with an additional change on UE autonomous transmission | Option 1 would revert what has been recently agreed and thus not preferred.  Depending on the clarification/harmonization on what it means by “the transmission is performed“, “Option 3: UE does not consider the timer has started” can also be considered. In this option, it is considered that the transmission is not performed when cancelled/de-prioritized in the middle. As written above, it is not consistent with NR-U WI wording in the MAC Spec.  For the sake of not complicating the spec too much, we prefer to clarify that the transmission is performed if (according to 5.4.2.2) that UE has   |  | | --- | | 3> instruct the physical layer to generate a transmission according to the stored uplink grant. |   This means that there is a need to do the below change   |  | | --- | | 3> if a MAC PDU had already been obtained for this HARQ process; and  3> if the uplink grant size matches with size of the obtained MAC PDU; and  3> if a transmission of the obtained MAC PDU has not been performed or has not finished:  4> consider the MAC PDU has been obtained. |   We are open to further wording suggestion and would like to know if companies are willing to clarify what it means by “the transmission is performed” in the MAC spec.  On the two CRs, we prefer adding changes in the subclause 5.4.1 and with the wording that “configuredGrantTimer for the correponding HARQ process of the de-prioritized uplink grants should be stopped if it is running”. We can add only this one sentence instead of in three places in which a grant is declared as deprioritized (note that the CR R2-2009753 has missed one place) |
| Samsung | Option 2 | LG’s TP or Ericsson’s TP look simpler. |

## 2.2 Overlapping between CG-PUSCH and MSGA

R2-2010053 proposes some clarification such that CG PUSCH should not be skipped if the overlapping PUSCH of MSGA is in another serving cell. More precisely, MAC should continue to process an active CG occasion if it does not overlap with any RAR grant and MSG PUSCH in the same serving cell. The proposed text change in TS 38.321 is copied below for convenience.

**R2-2010053:**

|  |
| --- |
| 5.4.1 UL Grant reception ……  For each Serving Cell and each configured uplink grant, if configured and activated, the MAC entity shall:  1> if the MAC entity is configured with *lch-basedPrioritization*, and the PUSCH duration of the configured uplink grant does not overlap with the PUSCH duration of an uplink grant received in a Random Access Response for this Serving Cell or with the PUSCH duration of a MSGA payload for this Serving Cell; or  1> if the MAC entity is not configured with *lch-basedPrioritization*, and the PUSCH duration of the configured uplink grant does not overlap with the PUSCH duration of an uplink grant received on the PDCCH or in a Random Access Response for this Serving Cell or with the PUSCH duration of a MSGA payload for this Serving Cell:  …… |

**Question 3: Do you agree the CR proposed in R2-2010053 ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **YES/NO** | **Comments** |
| Nokia | Yes but … | We think the text could be simplified a bit to something like:  ***…*** *does not overlap with the PUSCH duration of an uplink grant received in a Random Access Response or ~~for this Serving Cell or with the~~ PUSCH duration of a MSGA payload for this serving cell;* |
| LG | Agree | Nokia’s modification is also ok. |
| ZTE | Agree with “ for this serving cell” | Nokia’s suggestion can be ok, and there is no misinterpretation without the change “the MAC entity is not configured with *lch-basedPrioritization”* |
| Ericsson | Yes | We are fine with the simplification by Nokia.  For the comment by ZTE, we agree that there is no misinterpretation which is also indicated in the cover sheet. The issue is that it is not easy to follow the spec there and the cosmetic change make it crystal clear, but we will be okay to follow the majority view on this. |
| Samsung | Agree | Nokia’s modification is also ok. |

## 2.3 Multiple Entry CG Confirmation MAC CE

R2-2010100 mentions that MAC should first check if the uplink resource can accommodate Multiple Entry CG Confirmation MAC CE (along with its LCID) before generating it, to make sure the MAC CE can be conveyed by the uplink resource. The proposed text change in TS 38.321 is copied below for convenience.

**R2-2010100:**

|  |
| --- |
| 5.8.2 Uplink ……  The MAC entity shall:  1> if at least one configured uplink grant confirmation has been triggered and not cancelled; and  1> if the MAC entity has UL resources allocated for new transmission:  2> if, in this MAC entity, at least one configured uplink grant is configured by *configuredGrantConfigToAddModList*:  3> if the UL resources can accommodate the Multiple Entry Configured Grant Confirmation MAC CE plus its subheader as a result of logical channel prioritization:  4> instruct the Multiplexing and Assembly procedure to generate a Multiple Entry Configured Grant Confirmation MAC CE as defined in clause 6.1.3.31.  4> cancel the triggered configured uplink grant confirmation.  2> else:  3> instruct the Multiplexing and Assembly procedure to generate a Configured Grant Confirmation MAC CE as defined in clause 6.1.3.7.  3> cancel the triggered configured uplink grant confirmation.  …… |

**Question 4: Do you agree the CR proposed in R2-2010100 ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **YES/NO** | **Comments** |
| Nokia | No | The LCP priority of this MAC CE is very high and hence typically it will be mapped into the UL resource before most other MAC CE and data, so it would be extremely rare to have a case where the UL resource size cannot even accommodate this MAC CE. Furthermore, the proposed behaviour would require the UE to carry out additional checking before generating such MAC CE, which imposes additional UE implementation complexity for a corner case that may never happen in practice. |
| LG | Agree | All other MAC CEs are instructed to be generated by considering its corresponding MAC subheader size, so having only different text for multiple entry CG confirmation MAC CE is not preferred. |
| ZTE | No strong opinion | Since it have been discussed in the previous meeting, for this time, we follow majorities. |
| Ericsson | Not clear the difference from the previous version R2-2007390. | We are not sure the difference of this CR and the one in the previous meeting, R2-2007390. At least the CR cover sheet seems to be exactly the same. In light of this, we wonder the new change compared to the previous one so that this new CR would be agreeable. The chair note is copied below:  [R2-2007390](file:///D:/Documents/3GPP/tsg_ran/WG2/TSGR2_111-e/Docs/R2-2007390.zip) Correction on construction of Multiple Entry Configured Grant Confirmation MAC CE Huawei, HiSilicon CR Rel-16 38.321 16.1.0 0822 - F NR\_IIOT-Core  - Samsung think this could occur in Rel15 as there are other MAC CEs with higher priority.  - ZTE think this text wasn't there before as the MAC CE was very very small in R15.  - Nokia think this is a corner case.  - Chair think this is not really essential so R15 is not a good choice  - Huawei think main purpose is to align with other MAC CEs.  - Chair: there is some objections, so cannot agree, at least not now.   * Not agreed |
| Samsung | No (no strong view) | The size of the MAC CE is 6-byte and it has very high priority. We agree with Nokia that this is a corner case. From correction point of view, it seems not essential. But we are also fine to go this way if majority wants to correct. |

On the other hand, R2-2010522 proposes clarifying that Multiple Entry Configured Grant Confirmation MAC CE is applicable to cases with multiple CGs, as the current text could be interpreted as single CG. The proposed text change in TS 38.321 is copied below for convenience.

**R2-2010522:**

|  |
| --- |
| 5.8.2 Uplink ……  The MAC entity shall:  1> if at least one configured uplink grant confirmation has been triggered and not cancelled; and  1> if the MAC entity has UL resources allocated for new transmission:  2> if, in this MAC entity, at least one configured uplink grant is configured by *configuredGrantConfigToAddModList*:  3> instruct the Multiplexing and Assembly procedure to generate a Multiple Entry Configured Grant Confirmation MAC CE indicating all triggered configured uplink grant confirmation(s) as defined in clause 6.1.3.31.  2> else:  3> instruct the Multiplexing and Assembly procedure to generate a Configured Grant Confirmation MAC CE as defined in clause 6.1.3.7.  2> cancel all triggered configured uplink grant confirmation(s).  …… |

**Question 5: Do you agree the CR proposed in R2-2010522 ?**

|  |  |  |
| --- | --- | --- |
| **Company** | **YES/NO** | **Comments** |
| Nokia | No | We think the current specification is sufficiently clear. It cannot be misinterpreted as long as the description of Multiple Entry Configured Grant Confirmation MAC CE is clearly written. |
| LG | Partly Yes | The second change is agreeable. However, the first change seems not needed because CGi field in S6.1.3.31 clearly indicates how the Multiple Entry CG Confirmation MAC CE is built. |
| ZTE | Have no strong opinion | Since this is not a technical issue just a editorial change, Can follow majorities. |
| Ericsson |  | We are okay with the second change to clarify that multiple triggered confirmations can be cancelled instead of the single one.  We are not sure though on the need for the first change. The MAC CE field description reads as below (subclause 6.1.3.31):  - CGi: This field indicates whether PDCCH indicating activation or deactivation of configured uplink grant with *ConfiguredGrantConfigIndexMAC* i has been received. The CGi field is set to 1 to indicate that PDCCH indicating activation or deactivation of type 2 configured uplink grant with *ConfiguredGrantConfigIndexMAC* i has been received. The CGi field is set to 0 to indicate that PDCCH indicating activation or deactivation of type 2 configured uplink grant with *ConfiguredGrantConfigIndexMAC* i has not been received.  From this, UE is already required to transmit all triggered configured uplink grant confirmations. What might need to clarify (if not clear) is that UE should not keep a memory of the received PDCCH activation or deactivation command, once it has been transmitted in the UL to the network, i.e., all triggered confirmation is cancelled as in the second change. |
| Samsung | Yes (at least for the second change) | If all companies think the current text is clear, we are fine not to pursue the first change.  But we think the second change is essential, since the current text allows to cancel only one CG confirmation. It is not correct at all. |

# 3 Conclusion

Based on the email discussion, we conclude with the following proposals:

TBD